

WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, comprising the steps of:

forming a first semiconductor layer on a
5 substrate;

forming a first transparent electroconductive layer on the first semiconductor layer; and

forming a second semiconductor layer on the first transparent electroconductive layer,

10 the method further comprising executing passivation treatment on defects in the first semiconductor layer before the forming step of the second semiconductor layer.

15 2. The method of manufacturing a semiconductor device according to claim 1, wherein the passivation treatment is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the first transparent electroconductive layer
20 only on areas other than the defective areas in the first semiconductor layer.

3. The method of manufacturing a semiconductor device according to claim 1, wherein the passivation
25 treatment is, after the forming step of the first transparent electroconductive layer, to passivate the first transparent electroconductive layer overlying

the defective areas in the first semiconductor layer.

4. The method of manufacturing a semiconductor device according to claim 1, wherein the passivation
5 treatment is, after the forming step of the first transparent electroconductive layer by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the first transparent electroconductive layer overlying the defective areas
10 in the first semiconductor layer.

5. The method of manufacturing a semiconductor device according to claim 3, wherein the passivation treatment is to remove the first transparent
15 electroconductive layer overlying the defective areas in the first semiconductor layer.

6. The method of manufacturing a semiconductor device according to claim 3, wherein the passivation
20 treatment is to increase the resistance of the first transparent electroconductive layer overlying the defective areas in the first semiconductor layer.

7. The method of manufacturing a semiconductor
25 device according to claim 5, wherein the passivation treatment is executed by applying a voltage to the substrate.

8. The method of manufacturing a semiconductor device according to claim 5, wherein the passivation treatment is executed by applying a voltage to the substrate while the substrate is dipped into
5 electrolyte.

9. A method of manufacturing a semiconductor device, comprising:

forming a first semiconductor layer on a
10 substrate;
forming a first transparent electroconductive layer on the first semiconductor layer;
forming a second semiconductor layer on the first transparent electroconductive layer; and
15 forming a second transparent electroconductive layer on the second semiconductor layer,
the method further comprising the steps of:
executing passivation treatment on defects in the first semiconductor layer before formation of the
20 second semiconductor layer; and
executing passivation treatment on defects in the second semiconductor layer.

10. The method of manufacturing a semiconductor
25 device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, by utilizing a sputtering method adapted to

control a bias potential of the substrate, to form the first transparent electroconductive layer only on areas other than the defective areas in the first semiconductor layer, and

5 the passivation treatment for the defects in the second semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the second electroconductive layer only on areas other than the
10 defective areas in the second semiconductor layer.

11. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor
15 layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the first transparent electroconductive layer only on areas other than the defective areas in the first semiconductor layer, and

20 the passivation treatment for the defects in the second semiconductor layer is, after the formation of the second transparent electroconductive layer, to passivate the second electroconductive layer overlying the defective areas in the second
25 semiconductor layer.

12. The method of manufacturing a semiconductor

device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form
5 the first transparent electroconductive layer only on areas other than the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, after the
10 formation of the second transparent electroconductive layer by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the second electroconductive layer overlying the defective areas in the second
15 semiconductor layer.

13. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor
20 layer is, after the forming step of the first transparent electroconductive layer, to passivate the first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

25 the passivation treatment for the defects in the second semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential

of the substrate, to form the second electroconductive layer only on areas other than the defective areas in the second semiconductor layer.

5 14. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, after the forming step of the first transparent electroconductive layer, to passivate the
10 first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, after the forming
15 step of the second transparent electroconductive layer, to passivate the second electroconductive layer overlying the defective areas in the second semiconductor layer.

20 15. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, after the forming step of the first transparent electroconductive layer, to passivate the
25 first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, after the second transparent electroconductive layer is formed by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the second electroconductive layer overlying the defective areas in the second semiconductor layer.

16. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, after the first transparent electroconductive layer is formed by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the second electroconductive layer overlying the defective areas in the second semiconductor layer.

17. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor

layer is, after the first transparent
electroconductive layer is formed by utilizing a
sputtering method adapted to control a bias potential
of the substrate, to passivate the first transparent
5 electroconductive layer overlying the defective areas
in the first semiconductor layer, and

the passivation treatment for the defects in
the second semiconductor layer is, after the forming
step of the second transparent electroconductive
10 layer, to passivate the second electroconductive
layer overlying the defective areas in the second
semiconductor layer.

18. The method of manufacturing a semiconductor
15 device according to claim 9, wherein the passivation
treatment for the defects in the first semiconductor
layer is, after the first transparent
electroconductive layer is formed by utilizing a
sputtering method adapted to control a bias potential
20 of the substrate, to passivate the first transparent
electroconductive layer overlying the defective areas
in the first semiconductor layer, and

the passivation treatment for the defects in
the second semiconductor layer is, after the second
25 transparent electroconductive layer is formed by
utilizing a sputtering method adapted to control a
bias potential of the substrate, to passivate the

second electroconductive layer overlying the defective areas in the second semiconductor layer.

19. The method of manufacturing a semiconductor
5 device according to claim 2, wherein in the sputtering method adapted to control a bias potential of a substrate, a voltage is applied from a first power supply to a target, and a voltage is applied from a second power supply to the substrate, to
10 control the bias potentials independently of each other.

20. A method of manufacturing a semiconductor device, comprising the steps of:
15 forming a first semiconductor layer on a substrate;
forming a first transparent electroconductive layer on the first semiconductor layer, and
forming a second semiconductor layer on the
20 first transparent electroconductive layer; in this order,
wherein the forming step of the first transparent electroconductive layer is carried out by the process comprising the steps of:,
25 charging the substrate having the first semiconductor layer thereon to a negative potential;
applying ions to a sputtering target while the

substrate is charged to the negative potential; and
forming a sputtering film on the first
semiconductor layer as a first transparent
electroconductive layer.

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21. A semiconductor device, comprising at
least:

a substrate;

a first semiconductor layer formed on the
10 substrate and having defective areas;

a first transparent electroconductive layer
formed on areas other than the defective areas of the
first semiconductor layer; and

a second semiconductor layer formed on the
15 first transparent electroconductive layer.